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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Hosiery Looper (hosiery) 689.782

S-119

TM 001 252

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U. S. Employment Service in
Cooperation with
Wisconsin State Employment Service

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.
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GATB #2161
May 1957

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY FOR Hosiery Looper (hosiery) 689.782-014

S-119

Summary

The General Aptitude Test Battery, B-1002A, was administered to three groups of women employed as Loopers. One group of thirty-five women were employed as Hosiery Loopers, at the Wigwam Mills, Incorporated, in Sheboygan, Wisconsin. A second group of 30 women were employed as Hosiery Loopers at Infant Socks, Incorporated, in Fond du Lac, Wisconsin. The third group of 30 women were employed as Loopers at the Portage Hosiery Company in Portage, Wisconsin. The criterion used was supervisory ratings made by the plant foremen and supervisors. On the basis of the statistical results and the job analysis data, Aptitudes S-Spatial Aptitude, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Hosiery Looper (hosiery) 689.782. S-119

Table I shows, for B-1001 and B-1002 the minimum acceptable score for each aptitude included in the test norms for Hosiery Looper (hosiery) 689.782

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for S-119

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
S	CB-1-F CB-1-H	80	S	Part 3	75
F	CB-1-O CB-1-P	90	F	Part 11 Part 12	85
M	CB-1-M CB-1-N	75	M	Part 9 Part 10	75

Effectiveness of Norms

The data in Table IV indicate that 16 of the 29 poor workers, or 55 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 55 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 50 of the 63 workers who made qualifying test scores, or 79 percent, were good workers.

TECHNICAL REPORT

I. Problem

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Hosiery Looper (hosiery) 689.782

II. Sample

On December 28, 1956, 35 women employed as Loopers at the Wigwam Mills, Incorporated, in Sheboygan, Wisconsin were tested with the GATB, B-1002A. Eight women whose ages ranged from 50 to 54 years were eliminated from the sample because of age. On February 6 and 7, 1957, thirty women employed as Loopers at the Infant Socks, Incorporated in Fond du Lac, Wisconsin, were tested with the GATB, B-1002A. None of these workers were eliminated from the sample. On February 25, 1957, 32 women employed as Loopers at the Portage Hosiery Company, in Portage, Wisconsin were tested with the GATB, B-1002A. Two of these women whose ages were 62 and 64 were eliminated from the final sample.

The workers in the three groups were hired on the basis of a personal interview. There were no education or experience requirements, and no tests were used in selection.

Since the three groups of workers were sufficiently similar with respect to age, education, experience, job duties and job performance requirements, the data was combined to establish one sample of 87 workers.

Table II shows the means, standard deviations, ranges, and Pearson product-moment correlations (corrected for broad categories) with the criterion for age, education and experience.

TABLE II

Means (M), Standard Deviations (σ), Ranges and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion (σ^r) for Age, Education, and Experience

Hosiery Looper (hosiery) 689.782
N = 87

	M	σ	Range	σ^r
Age (years)	30.1	9.4	18-49	.202
Education (years)	10.6	1.6	8-12	-.022
Experience (months)	76.0	71.7	3-360	.270*

* Significant at the .05 level

The correlations between age and the criterion, and between education and the criterion are not significant. The correlation between experience and the criterion is significant at the .05 level, indicating a slight tendency for workers with more experience to be rated as better workers. However, the correlation of .270 is not large in magnitude, and is produced in part by the size and the wide range in experience of the combined sample. No attempt was made to select a more homogeneous sample with respect to experience or to correct the criterion for experience.

III. Job Description

Job Title: Hosiery Looper (hosiery) 689.782-014

Job Summary: Operates a looping machine to close the opening in the toe of seamless hosiery. Prepares machine for sewing by threading proper colored thread through guides, tension discs, and needle of machine. Sets loops of stitches of two edges of open toe of ladies' and children's seamless hosiery, athletic and boat socks, and men's socks on the looping machine for sewing. Steps on treadle to start rotating dial containing looping points, and to start sewing so that machine automatically joins the two sides of the toe and trims the edges of the seam. Ties socks in bundles of one dozen pairs. Records lot numbers and quantity of socks sewn. May adjust tension of threading mechanism. Notifies mechanic when machine is not operating properly.

IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

The criterion consists of supervisory ratings combined from two sets of rank order broad category ratings made by the supervisor or foreman in charge of the workers at each of the three plants. At Wigwam Mills, Incorporated, the ratings were made by the plant forelady of the 27 workers on December 27, 1956 and on March 22, 1957. At Infant Socks, Incorporated, the ratings were made by the plant foreman of the 30 workers on February 1, 1957 and March 1, 1957. At the Portage Hosiery Company the ratings were made by the plant supervisor of 30 workers on February 25, 1957 and on March 21, 1957. For the final criterion, the number of workers classified into each of five broad categories on the basis of the two sets of ratings was obtained and the quantitative score corresponding to each category was computed.

Five broad categories rather than three categories of Above Average, Average and Below Average were used to retain more of the discrimination that was present in the ratings. These 5 categories, the number of workers in each category, and the quantitative score corresponding to each category are shown below:

Category	N	Quantitative Score
AA	28	61
AB	5	55
BB	25	49
BC	6	44
CC	23	38

A very high degree of agreement was obtained between the first ratings and the second ratings of the supervisors. (A product-moment correlation corrected for broad categories was over 1.00.)

VI. Statistical and Qualitative Analysis

Table III shows the means, standard deviations and Pearson product-moment correlations (corrected for broad categories) with the criterion for the aptitudes of the GATB. The means and standard deviations of the aptitudes are comparable to general population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion ($_{o}r$) for the Aptitudes of the GATB

Hosiery Looper (hosiery) 689.782
N = 87

Aptitudes	M	σ	$_{o}r$	
G-Intelligence	96.2	13.7	.262*	G
V-Verbal Aptitude	96.7	13.8	.160	
N-Numerical Aptitude	98.3	15.9	.182	
S-Spatial Aptitude	97.1	14.9	.167	
P-Form Perception	104.0	14.3	.107	P
Q-Clerical Perception	105.8	13.3	.226*	Q
K-Motor Coordination	105.6	13.2	.194	K
F-Finger Dexterity	100.1	18.7	.173	
M-Manual Dexterity	101.3	17.5	.114	

** Significant at the .01 level
* Significant at the .05 level

A. Statistical Analysis

The data in Table III indicate that the highest mean scores, in decreasing order of magnitude, were obtained for Aptitudes Q, K, P, M and F. All the aptitudes have standard deviations less than 20. Aptitudes G and Q have correlations with the criterion which are significant at the .05 level.

B. Qualitative Analysis

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation:

Spatial Aptitude (S) - required for setting loops of stitches of two edges of open toe of hosiery on the looping machine for sewing.

Form Perception (P) - required to detect defects in the weaving when machine is not operating properly.

Motor Coordination (K) - required to thread the machine and in hanging the loops on the looping points.

Finger Dexterity (F) - required to thread the machine and in hanging the loops in the looping points.

Manual Dexterity (M) - required in handling thread cones and bundles of socks.

C. Selection of Test Norms

On the basis of the above statistical and qualitative evidence Aptitudes G, S, P, K, F, and M were considered further for inclusion in the test norms. Aptitudes P, K, F, and M had high mean scores and were considered important from the job analysis data. There is no statistical evidence for Aptitude S, but it appears sufficiently important from job analysis to warrant further consideration for inclusion in the norms. Aptitude G was considered for inclusion on the basis of its significant correlation with the criterion. Although Aptitude Q had a high mean score and a significant correlation with the criterion, it was not included for further consideration because it was decided that the trait of perception involved in this job was better measured by form perception rather than clerical perception.

Several sets of trial norms, consisting of various combinations of Aptitudes G, S, P, K, F, and M with appropriate cutting scores, were evaluated against the dichotomized criterion. The best selective efficiency was obtained for norms which consisted of S-75, F-85 and M-75.

VII. Concurrent Validity of Norms for Hosiery looper (hosiery) 689.782

Table IV shows the relationship between the norms consisting of Aptitudes S, F, and M with cutting scores of 75, 85 and 75, respectively, and the dichotomized criterion. Those workers included in groups "AA," "AB," and "BB," were placed in the high criterion group and designated as "good workers." Those workers included in groups "BC" and "CC" were placed in the low criterion group and designated as "poor workers."

TABLE IV

Relationship between Test Norms Consisting of Aptitudes S, F, and M with Cutting Scores of 75, 85, and 75, Respectively, and the Dichotomized Criterion

Hosiery Looper (hosiery) 689.782
N = 87

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	8	50	58
Poor Workers	16	13	29
Total	24	63	87

$r_{tet} = .67$ $\quad X^2 = 14.565$

$\sigma_{r_{tet}} = .19$ $\quad P/2 < .0005$

The data in the above table indicate a significant relationship between the test norms and the criterion.

VIII. Conclusions

On the basis of mean scores, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes S, F, and M with minimum scores of 75, 85, and 75, respectively, are recommended as B-1002 norms for the occupation of Hosiery Looper. The equivalent B-1001 norms consist of S-80, F-90, and M-75.

The results of this study were analyzed in conjunction with the data for a test development study on Looper 6-14.420 conducted by the North Carolina Agency in an attempt to establish national norms for this occupation on the basis of both studies. This attempt was not successful. Since the Wisconsin sample of 87 workers is larger than the North Carolina sample of 57, the Wisconsin sample was selected as the basis for establishing test norms for this occupation.

IX. Determination of Occupational Aptitude Pattern

When the specific test norms for an occupation include three aptitudes, only those occupational aptitude patterns which include the same three aptitudes with cutting scores that are within 10 points of the cutting scores established for the specific norms are considered for that occupation. The only one of the existing 23 occupational aptitude patterns which meets these criteria for this study is OAP-14, which consists of

S-80, F-90, and M-85 for B-1002 and S-85, F-95, and M-90 for B-1001. The selective efficiency of OAP-14 for the sample was determined by means of the tetrachoric correlation technique. A tetrachoric correlation of .40 with a standard error of .18 was obtained, which indicates a significant relationship between OAP-14 and the criterion for this experimental sample. The proportion of the sample screened out by OAP-14 was .45, which is within the required range of .10 to .60. Therefore, it is recommended that OAP-14 be used in counseling for the occupation of Hosiery Looper (hosier 689.782.